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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,287	06/05/2001	Tomio Sugiyama	2635-16	4759

23117 7590 03/13/2003

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EXAMINER

TUNG, TA HSUNG

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 03/13/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/873,287

Applicant(s)

SUGIYAMA, T.

Examiner

T. TUNG

Group Art Unit

1753

Paper No. 6

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- ☒ Responsive to communication(s) filed on 2/21/03
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1-12 is/are pending in the application.
- Of the above claim(s) 7-12 (election made without traverse in paper No. 5) is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-6 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☒ All ☐ Some* ☐ None of the:
- ☒ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. _____.
- ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☐ Interview Summary, PTO-413
- ☒ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Other _____

Office Action Summary

Art Unit: 1102

Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, lines 2-3, it is unclear whether the language calls for one zirconia sheet and one alumina sheet, or a plurality of each sheet. While, "a....sheet" indicates one sheet, "series" indicates a plurality of sheets.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al 4,798,693 or Mase et al 4,861,456 in view of Radford et al 3,843,400 or Kobayashi et al 4,961,835.

Mase '693 discloses a sensing element comprising a plurality of alumina sheets 18, 20, 24 (figures 1 and 20), 48, 82, 72, 76 (figure 8) and a plurality of zirconia sheets 2, 4, 6 (figures 1-2), 50, 56 62, 80 (figure 8). See col. 4, line 59 to col. 8, line 53; col. 11, lines 9-36.

Mase '456 discloses a similar sensing element comprising a plurality of alumina sheets 16, 20, 34, 54 and a plurality of zirconia sheets 10, 8, 28, 50. See figure 1-3; col. 4, line 30 to col. 8, line 41.

Art Unit: 1102

Applicant's claims differ by calling for a bonding boundary between an alumina sheet and a zirconia sheet to include a crystal phase containing silica.

Radford disclose adding 0.5 to 2 mol% of silica to a zirconia solid electrolyte. See col. 2, line 71 to col. 3, line 24.

Kobayashi discloses adding silica to a zirconia solid electrolyte. See Table 1 in column 5.

It would have been obvious to add silica to the zirconia sheets of either Mase in view of Radford, because Radford discloses silica to be a sintering aid that would lower the sintering temperature of the zirconia (see col. 2, last line). It would also have been obvious for either Mase to incorporate silica in its zirconia sheets in view of Kobayashi, because that would give the zirconia an advantageous coefficient of thermal expansion as well as better low temperature operating characteristics and better life characteristics (see col. 2, lines 58-66; col. 4, lines 11-51; Table 2 in column 5 of Kobayashi).

Once the silica is incorporated into the zirconia, it is clear that the sintering process to laminate the sheets into a sensing element will inherently provide a boundary between an alumina sheet and a zirconia sheet that would include a crystal phase containing silica.

As for claim 2, note that Radford at col. 3, lines 15-16 discloses the presence of both silica and calcia.

As for claim 5, the coefficients of expansion for both zirconia and alumina are known and would inherently have a difference less than 2×10 to the minus 6.

Art Unit: 1102

As for claim 6, the sintering contraction coefficient difference must be inherent of the combination of references, since all the materials are the same as those employed by applicant.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Mase et al in view of Radford et al or Kobayashi et al and Ishiguro et al 4,851,105.

This claim further differs by calling for the bonding boundary to be undulated.

Ishiguro discloses a zirconia sheet bonded to an alumina-containing sheet 12 at an undulating boundary. See figure 2(b). It would have been obvious for either Mase to adopt the undulating boundary of Ishiguro in order to strength the anchoring/bonding of a zirconia sheet to an alumina sheet, as discussed at col. 6, lines 24-41 of Ishiguro.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Mase et al in view of Radford et al or Kobayashi et al and Japan 9-26409.

This claim further differs by calling for a difference in the coefficients of expansion of the zirconia sheet and the alumina sheet to be less than 2×10 to the minus 6.

Japan '409 discloses having that difference to be between 0 and 0.2%. See page 4, lines 7-8 of the translation. It would have been obvious for either Mase to adopt a virtually zero difference between these coefficients, as taught by Japan, in order to minimize thermal stress.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Mase et al in view of Radford et al or Kobayashi et al and Japan 08-114571.

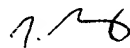
This claim further differs by calling for a sintering contraction coefficient difference between a zirconia sheet and an alumina sheet to be less than 3%.

Art Unit: 1102

Japan '571 discloses such a sintering contraction coefficient difference. See the fourth line from the bottom of the English abstract. It would have been obvious for Mase to adopt this sintering contraction coefficient difference to minimize thermal stress.

Esper et al 4,183,798 discloses adding silica to a solid electrolyte. See col. 2, lines 3-54.

The examiner can be reached at 703-308-3329. His supervisor Nam Nguyen can be reached at 703-308-3322. Any general inquiry should be directed to the receptionist at 703-308-0661. A fax number for TC 1700 is 703-872-9310.



Ta Tung

Primary Examiner

Art Unit 1753